

# Imaging of inguino-scrotal urinary bladder hernias

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European Journal of Medical Case Reports

Volume 5(5):154–159

<https://doi.org/10.24911/ejmcr/173-1613583943>



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## ABSTRACT

**Background:** Herniation of urinary bladder through the inguinal canal is a rare disease that requires surgery. The resulting combination of failure of the abdominal wall and an increase in intra-abdominal pressure occurs prolapse of the urinary bladder in the inguinal canal and the occurrence of inguino-scrotal hernia.

**Case Presentation:** This phenomenon is very rare and often misdiagnosed. It occurs more often in older men with increased body weight and symptoms of distal urinary obstruction and urinary infections. The symptoms usually are mild to moderate, associated with hindered urination and urinary infections, and if this condition is promptly left untreated it can lead to serious health problems, such as renal failure. computed tomography reconstruction in three planes is the method of choice in the diagnosis of inguino-scrotal hernia of the bladder.

**Conclusion:** This method provides a clear display of the herniated part of the urinary bladder and allows detection of the contents of the hernia sac.

**Keywords:** CT, inguino-scrotal hernia, urinary bladder, US, contents of the hernia sac.

Received: 17 February 2021

Accepted: 16 April 2021

Type of Article: CASE SERIES

Specialty: Radiology

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## Background

Inguino-scrotal bladder hernia (ISBH) was first described by Levine in 1951 as a scrotal cystocele. [1] About 1%-4% of inguinal hernias involve the bladder. In overweight older men, the percentage of bladder involvement in inguinal hernias is higher and can reach up to 10%. Causes of bladder herniation include distal urinary obstruction, chronic urinary tract infections, and increased intra-abdominal bladder emptying pressure [2,3]. Distal urinary obstruction is most commonly caused by benign prostatic hyperplasia (BPH) leading to incomplete bladder emptying [4]. ISBH usually does not cause any specific symptoms and is therefore often misdiagnosed [5]. Most often there is a compressible mass in the inguinal scrotal region that varies in size, and there is difficulty urinating. Urination takes place in two acts, the first is spontaneous emptying of the bladder and the second is compression of the inguinal scrotal mass and emptying of the bladder [3]. A giant ISBH is very rare and usually requires surgery. [6] They usually do not cause any specific symptoms and are therefore often misdiagnosed [7]. If left untreated, they can lead to serious health problems, such as renal failure [8,9].

Our goal is to emphasize the value of computed tomography (CT) in the diagnosis of inguinal scrotal bladder hernia as a method that provides accurate diagnosis and clear

presentation of the hernia in multiple planes. This enables the undertaking of appropriate measures by the surgeons for permanent remediation of the condition.

## Case Presentation

We present a series of two patients aged 75 and 76 years with a large inguino-scrotal hernia of the bladder. Patients underwent abdominal CT, native, and post-contrast series in three stages. The examination was performed on a GE Brightspeed MDCT computed tomography device with 16 rows of detectors. The recording is carried out at a pipe voltage of 120 kV. The rotation speed is 0.8 seconds. The pitch factor is 1.375: 1. The recording is carried out in an automatic mA setting (Auto mA) and usually ranges from 100 to 400 mA. The cross-sectional thickness of the native series is 1.5 mm, and that of the post-contrast series is 1.25 mm. The noise index is 13. The maximum wide field of view is used. The reconstruction matrix is 512 × 512 pixels.

The first patient was a 76-year-old man with pain in the distal part of the abdomen. The patient came to the emergency center of our hospital. After clinical and laboratory examinations, acute appendicitis was suspected and the patient was sent for abdominal CT. The reason for the CT examination

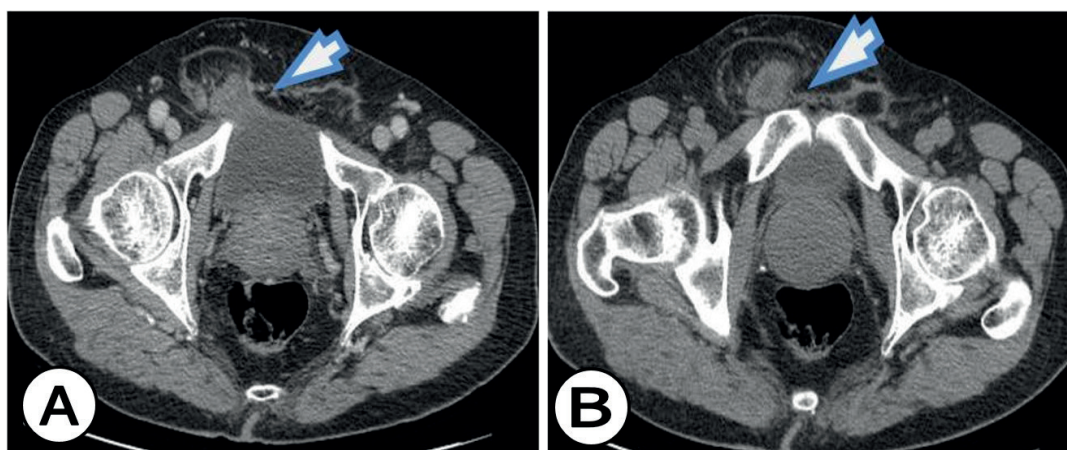
was abdominal and pelvic pain. A right-sided inguinal bladder hernia was found as a random finding (Figures 1 and 2). This is a direct inguinal hernia of part of the bladder. Apart from intraperitoneal adipose tissue and part of the bladder, there were no small intestinal loops in the hernia sac. The patient had an increased prostate volume in addition to BPH. The prostate had a homogeneous structure, clearly bounded by surrounding structures, with no signs of infiltration of the periprostatic space. Reconstruction of the sagittal and coronary planes was carried out to provide an even clearer picture of bladder herniation.

The second patient was a 75-year-old overweight man with pain in the distal part of the abdomen and the symptoms of distal urinary obstruction. After clinical and laboratory examinations, distal urinary obstruction is suspected and the patient was sent for abdominal CT. The reason for the CT examination was abdominal pain and distal urinary obstruction. The patient complained of swelling in the right inguinoscrotal region which was of variable size, as well as difficulty in urinating in favor of distal urinary obstruction. In the patient, the prostate was markedly enlarged, impresses the bladder,

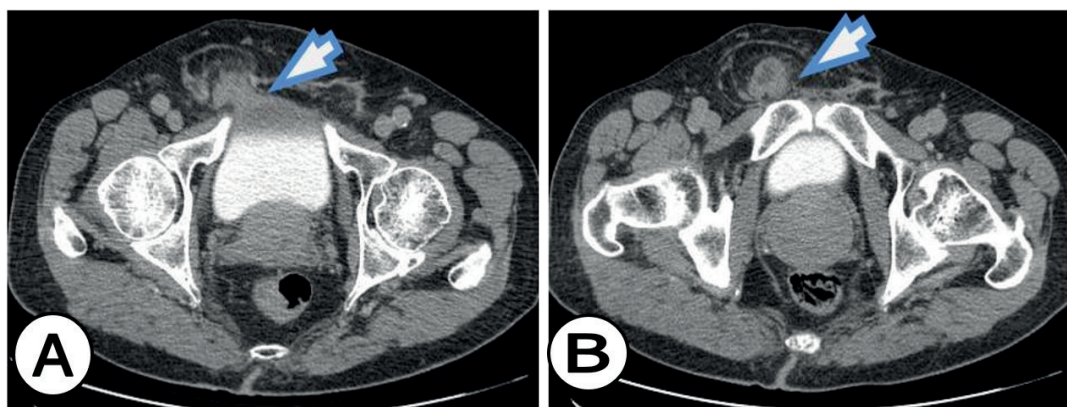
and extends into its lumen (Figure 3). The prostate was relatively clearly demarcated, with a homogeneous structure in addition to BPH. The bladder had a thickened wall and much of the bladder had herniated into the inguinal canal and descended in to the scrotum. It is a direct inguinal hernia of most of the bladder. Apart from intraperitoneal adipose tissue and part of the bladder, there were no small intestinal loops in the hernia sac. Reconstruction of the sagittal and coronal planes was carried out to provide an even clearer picture of bladder herniation (Figures 4 and 5). The patient also underwent a Ultrasonography (US) examination of the small pelvis and inguino-scrotal region, giving a clear visualization of a bladder impressed by an enormously enlarged prostate (BPH) with visible herniation in the inguinal canal. An exploration of the right inguinal scrotal region was carried out with a linear probe, clearly visualizing the herniated part of the bladder in the scrotal sac (Figure 6).

### Discussion

In the cases presented, patients have a pronounced direct inguinal hernia of part of the bladder, without pronounced

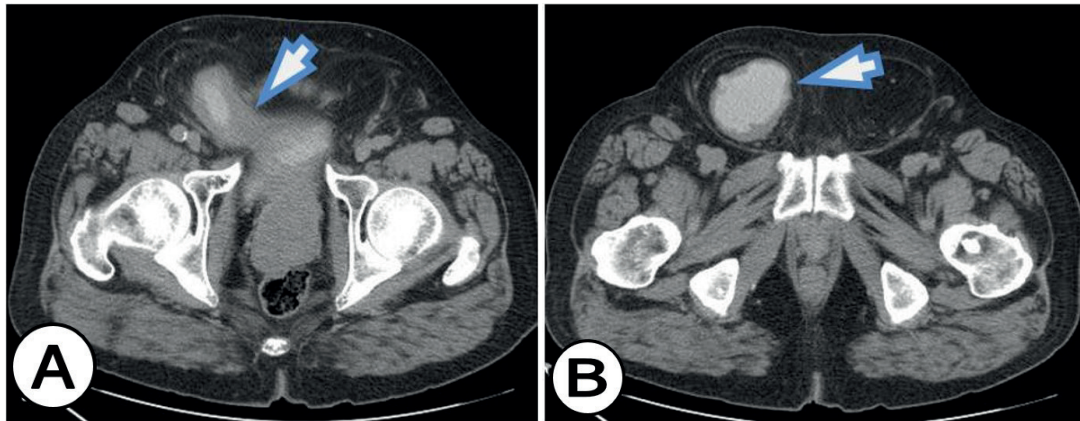


**Figure 1.** (A and B). Direct inguinal bladder hernia in a 76-year-old man. Axial CT images of the abdomen (arterial phase) at the level of the pelvis. Axial CT scan showing a herniation of part of the bladder in the inguinal canal (arrow).

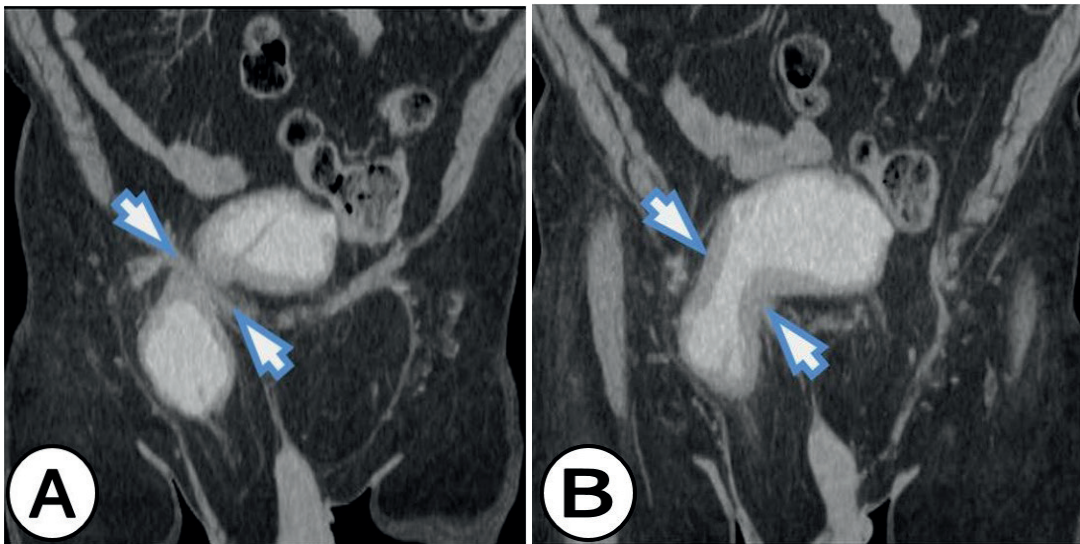


**Figure 2.** (A and B). Direct inguinal bladder hernia in a 76-year-old man. Axial CT images of the abdomen (late phase) at the level of the pelvis. Axial CT scan showing a herniation of part of the bladder in the inguinal canal (arrow).

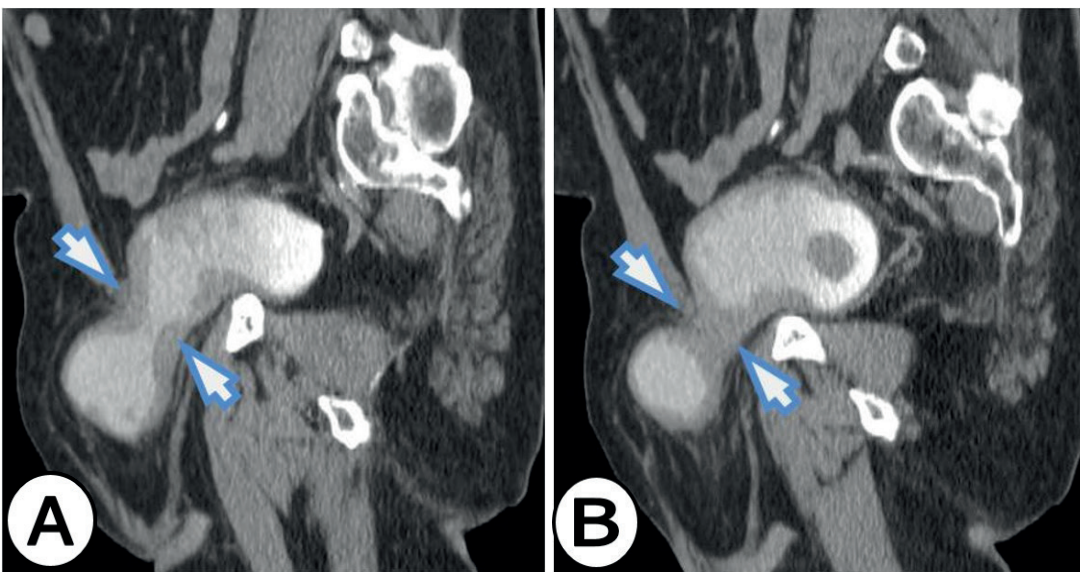




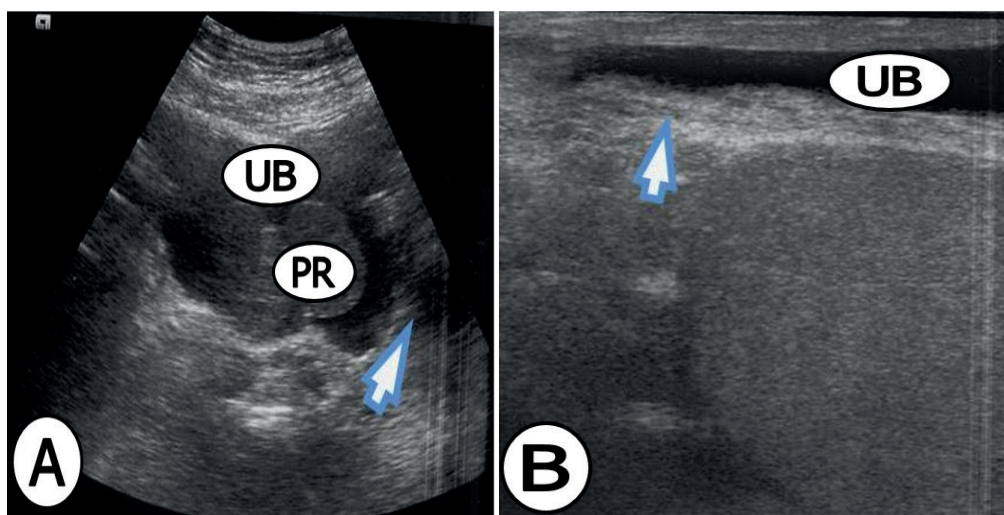
**Figure 3.** (A and B). Direct inguinal hernia of the right bladder in a 75-year-old man. Axial CT sections of the abdomen (late stage) at the level of the pelvis. Axial CT scan showing a herniation of part of the bladder in the right inguinal canal with propagation to the scrotum (arrow).



**Figure 4.** (A and B). Coronal reconstruction of CT of the abdomen (late stage). The CT reconstruction in the coronary plane showing a direct inguinoscrotal hernia of the bladder (arrow).



**Figure 5.** (A and B) Sagittal reconstruction of CT of the abdomen (late stage). The CT reconstruction of the sagittal plane showing a direct inguinoscrotal hernia of the bladder (arrow).



**Figure 6.** Direct inguinal hernia of the right bladder in a 75-year-old man. US examination of the pelvis and inguinoscrotal region: (a) clear visualization of a bladder impressed by an enormously enlarged prostate (BPH) with visible herniation in the inguinal canal (arrow); (b) exploration of the inguinoscrotal region with a linear probe. Clear visualization of the herniated part of the bladder in the scrotal sac (arrow).

symptomatology and present complications, especially without signs of chronic renal impairment. Surgical treatment of inguinal, ISBH was recommended in both patients. The share of the bladder in inguinal and inguinal scrotal hernias was less than 4% and could reach up to 10% in the elderly with overweight [10]. Predisposing factors may be overweight, weakness of the distal musculature of the abdominal wall, and distal urinary obstruction, most commonly caused by BPH [2-4]. More commonly, it is a direct inguinal bladder hernia that may be confined to the inguinal canal or may have extended to the scrotum. Most cases are asymptomatic and are usually diagnosed accidentally [5]. If an enlarged prostate is present, patients usually complain of difficulty urinating, rather than the inguinal hernia itself. Therefore, these patients are most commonly diagnosed with BPH, and the inguinal or inguinal scrotal hernia of the bladder is overlooked [11].

US, especially CT of the lower abdomen and scrotum, can help diagnose a bladder hernia, especially in cases where there is comorbidity [12,13]. However, scrotal compression to initiate urination is characteristic of this condition and may lead to an accurate diagnosis [3]. Both US and CT of the lower abdomen and scrotum may assist in the diagnosis of ISBH [7,14].

The bladder is involved in less than 4% of all inguinal hernias and most cases are undiagnosed before surgery [10]. Most bladder hernias are direct, with 70% being male-dominated, and most cases occurring on the right side [3]. Bladder hernias are anatomically classified into paraperitoneal which is the most common type, followed by intraperitoneal and extraperitoneal [3]. Our cases were of the direct inguinal hernia type where the intraperitoneal bladder is herniated.

Factors involved in the pathophysiology of bladder hernia include distal urinary obstruction (BPH), strictures of the

bladder neck and urethra, decreased bladder tone, pelvic muscle weakness, and overweight [2,3]. In our case, the cause of bladder herniation is BPH, decreased bladder tone, and muscle weakness of both the abdominal wall and the pelvic muscles.

Small bladder hernias are usually asymptomatic and are usually diagnosed accidentally during surgery or CT scan for other abdominal pathology [14,15]. Large inguinal scrotal hernias present in two stages of urination, with the first stage occurring spontaneously and the second stage requiring active manual compression of the hernia by the patient to empty residual urine. Non-specific urinary symptoms such as frequent urination, an urgency to urinate, nocturnal urination, dysuria, and hematuria may be due to distal urinary obstruction or urinary tract infection. In such cases, inguinal tenderness may occur during urination due to soft tissue enlargement in the groin area due to ISBH.

The diagnosis is made based on clinical findings, medical history, physical examination, and radiological examination. Radiological examinations are crucial in making a diagnosis of ISBH. The methods used are conventional radiological methods such as retrograde cystography, intravenous urography, pyelography, and imaging methods such as US and CT. US and CT are the methods of choice in evaluating the distal abdomen and scrotum [7,10,12-15]. Anatomical deformities, such as all potential complications such as bladder or bowel infarction, are easily detected. Of course, if the US examination of the inguinal region detects a collection of fluid, it should be taken into account that there may be an ISBH. Other key diagnostic moments are visualization of tissue in the inguinal canal and scrotal sac with similar echogenicity to that of the bladder, visible connection to the bladder, and variation in the dimensions of the inguinal contents before and after bladder emptying [7,12].



CT has recently been used quite often to visualize inguinal hernias before they are treated surgically. This allows the contents of the hernia to be visualized, as well as to rule out the incarceration of herniated intestinal loops. This increases the possibility of preoperatively diagnosing the presence of a bladder hernia in the inguinal scrotal region [10,13-15]. CT is considered to be a particularly useful method not only for the detection of bladder hernias, but also for the detection of the contents of the hernia, which may include part of the intestine, omentum and, of course, the present complications such as strangulation and bladder infarction or alteration of the intestinal vesicles [15]. CT is particularly useful for showing bladder herniation in three planes, for detecting the contents of the hernia, and what is of particular importance is not invasive compared with retrograde cystography. It allows planning for surgical treatment of a bladder hernia and reduces the risk of possible complications.

### Conclusion

We can conclude that CT is the method of choice in the diagnosis of inguino-scrotal hernias of the bladder. This method provides a clear view of the herniated part of the bladder, and also allows detection of the contents of the hernia sac because in it can be found small intestinal vesicles. The method is easy to perform, non-invasive, the patient is in a comfortable position, and no hospitalization is required to perform the diagnostic procedure. Three-plane CT reconstruction is the best technique for diagnosing bladder hernias and, most importantly, is non-invasive compared to retrograde cystography. CT is superior in the diagnosis of bladder herniation compared to all other diagnostic methods available to us.

#### What is new?

Urinary bladder hernias usually do not cause any specific symptoms and are therefore often misdiagnosed. If left untreated, they can lead to serious health problems, such as renal failure. Our goal is to emphasize the value of computed tomography in the diagnosis of inguinal scrotal bladder hernia as a method that provides accurate diagnosis. This enables the undertaking of appropriate measures by the surgeons for permanent remediation of the condition.

#### List of Abbreviations

BPH	Benign prostate hypertrophy
CT	Computed tomography
FOV	Field of view
ISBH	Inguino-scrotal bladder hernia
PR	prostate
UB	Urinary bladder
US	Ultrasonography

#### Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this article.

#### Funding

None.

#### Consent for Publication

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

#### Ethical approval

Ethical approval is not required at our institution to publish an anonymous case report.

#### Author details

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### Summary of the case

1	<b>Patient (gender, age)</b>	Female, 40-year-old
2	<b>Final diagnosis</b>	Catastrophic anti-phospholipid syndrome APLS
3	<b>Symptoms</b>	Severe upper-right quadrant pain, nausea, and vomiting
4	<b>Medications</b>	Methylprednisolone, Heparin, IV immunoglobulin
5	<b>Clinical procedure</b>	Methylprednisolone 1.5 mg/kg and plasmapheresis commenced immediately, IV immunoglobulin 1 mg/kg given for 2 days, heparin infusion started with target APTT 60-70 seconds with close monitoring of blood count
6	<b>Specialty</b>	Radiology